

CLAIMS

What is claimed:

1. A method for calibrating a programmable material consolidation apparatus, comprising:
viewing at least one location substantially at a consolidation elevation of a fabrication site of the programmable material consolidation apparatus;
evaluating data obtained from viewing the at least one location; and
determining an amount of adjustment to be made to at least one component of the programmable material consolidation apparatus.
2. The method of claim 1, wherein viewing is effected from above the consolidation elevation.
3. The method of claim 1, wherein viewing is effected substantially at the consolidation elevation.
4. The method of claim 1, wherein evaluating comprises comparing the data to at least one expected data value.
5. The method of claim 1, wherein determining comprises determining that no adjustment of the at least one component need be made.
6. The method of claim 1, further comprising:
adjusting the at least one component by the amount of adjustment.
7. The method of claim 1, further comprising:
adjusting the at least one element of the programmable material consolidation apparatus by at least a portion of the amount of adjustment.

8. The method of claim 1, further comprising:
fabricating at least one feature substantially at the consolidation elevation.
9. The method of claim 8, wherein viewing comprises viewing the at least one feature.
10. The method of claim 9, wherein fabricating includes fabricating a plurality of reference pixels substantially at the consolidation elevation.
11. The method of claim 10, wherein evaluating data comprises comparing actual locations of the plurality of reference pixels to anticipated locations for the plurality of reference pixels.
12. The method of claim 11, further comprising:
adjusting reference grid data by at least a portion of the amount of adjustment.
13. The method of claim 11, further comprising:
adjusting a material consolidation element of the programmable material consolidation apparatus
by at least a portion of the amount of adjustment.
14. The method of claim 13, further comprising:
adjusting reference grid data by at least a portion of the amount of adjustment.
15. The method of claim 1, wherein viewing comprises moving a viewpoint from which viewing is effected along a path of a plurality of spaced apart reference pixels, each having a common, known dimension.
16. The method of claim 15, further comprising:

positioning a calibration plate including the plurality of spaced apart reference pixels substantially at the consolidation elevation.

17. The method of claim 15, wherein moving is effected substantially linearly.
18. The method of claim 15, wherein viewing further comprises detecting transitions in contrast.
19. The method of claim 15, wherein viewing further comprises determining a number of reference pixels viewed as the viewpoint is moved a particular distance.
20. The method of claim 19, wherein evaluating data comprises evaluating the particular distance, the number of reference pixels viewed, and the common, known dimension of the reference pixels to determine a magnification at the viewpoint.
21. The method of claim 20, further comprising:
repeating the acts of moving, viewing, and evaluating at least once to verify the magnification at the viewpoint.
22. The method of claim 20, further comprising:
using the magnification at the viewpoint to control operation of a material consolidation element of the programmable material consolidation apparatus.
23. The method of claim 1, further comprising:
directing selectively consolidating energy toward a plurality of locations of the consolidating elevation.
24. The method of claim 23, wherein directing includes directing the selectively consolidating energy toward at least one location proximate a corner or an edge of a rectangular field of exposure at the consolidating elevation.

25. The method of claim 23, wherein at least some of the plurality of locations are in substantially linear alignment.

26. The method of claim 23, wherein viewing comprises viewing actual locations of the consolidating elevation to which the selectively consolidating energy is directed.

27. The method of claim 26, further comprising:
placing at least one light sensitive element substantially at the consolidating elevation, the viewing being effected with the at least one light sensitive element.

28. The method of claim 26, wherein viewing is effected from above the consolidating elevation.

29. The method of claim 26, wherein evaluating data comprises comparing the actual locations to anticipated locations of the consolidating elevation where selectively consolidating energy was expected to be directed.

30. The method of claim 23, further comprising:
adjusting a material consolidation element of the sterelithographic fabrication system by at least a portion of the adjustment amount to increase a linearity of a path of consolidating energy generated by the material consolidation element.

31. A calibration system for use with a programmable material consolidation apparatus, comprising:
at least one imaging element; and
a controller in communication with the at least one imaging element and programmable to effect at least one calibration program that facilitates adjustment of at least one feature of the programmable material consolidation apparatus to calibrate the same.

32. The calibration system of claim 31, wherein the at least one imaging element comprises a machine vision system associated with the programmable material consolidation apparatus.

33. The calibration system of claim 31, wherein the at least one imaging element comprises at least one light sensitive element configured to be positioned at a location of the programmable material consolidation apparatus at which material consolidation is to occur.

34. The calibration system of claim 33, wherein the at least one light sensitive element is positioned at corners or edges of a field of exposure of the programmable material consolidation apparatus.

35. The calibration system of claim 33, comprising a plurality of light sensitive elements.

36. The calibration system of claim 31, further comprising:
a calibration plate including reference features thereon, the calibration plate being configured for placement at a location of the programmable material consolidation apparatus at which material consolidation is to occur.